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ABSTRACT

Extensive research has proven that the functions of the two hemispheres of the brain tend to be qualitatively different. The left hemisphere, which for most people is dominant, is the major controller of speech, reading, and writing; it is the hemisphere toward which education traditionally has been directed. The right hemisphere excels in nonverbal skills. It also appears to be responsible for providing the intuitive, imaginative, creative side of human personality. It is this hemisphere that many educators claim has been neglected in the schools. The challenge for the teacher of reading is to draw upon both modes of knowing to enhance comprehension. Teachers need to learn how to encourage expression of the nondominant and creative right hemisphere to facilitate the active, problem-solving left hemisphere; to ignore the function of the right hemisphere is to teach only half the child. Numerous teaching/learning activities could effectively be used to draw upon both brain sides; among them: the active art of questioning by both the student and the teacher; daily exposure to literature and writing opportunities; diagnostic teaching; and individual conferences. Knowledge of the two hemispheres can help educators see the complexities of learning more clearly and impress upon them the need for increased diversity in curricula and methods. (FL)

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READING COMPREHENSION AND RIGHT/LEFT BRAIN THINKING

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Such strong popular interest in split brain research has developed that "split-brain psychology" has just been hailed as the "fad of the year." (4:89) While there may be promotors and entrepreneurs who are capitalizing on this popular interest and misrepresenting the nature of human consciousness, the findings of serious researchers on hemisphericity do warrant the careful study of all educators. Split brain research has provided new insights into the learning-teaching process, as well as physiological support for good teaching practices that in the past have had only philosophical or intuitive support.

SPLIT BRAIN RESEARCH

In 1961, neurosurgeons Joseph Bogen and Philip Vogel performed the first split brain operation on a human being in an effort to eliminate severe epileptic seizures. By cutting the corpus callosum (the large bundle of over two million nerve fibers that connects the two halves of the brain), they found that the seizures were eliminated and that the patient seemed otherwise normal. But, when Dr. Roger Sperry (9), a psychobiologist, began testing the patient, he discovered that the patient could, under special test conditions, actually function as if there

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were two minds in one head. Sperry found that without the corpus callosum in tact, there was no longer any transfer of information from one side of the brain to the other. Hence, input from the left side of the body, which is first received by the right half of the brain, was not reaching the left side of the brain, and vice versa. For example, when a picture was presented only to the right visual field, and hence transmitted to the left side of the brain, the verbal left side of the brain was able to speak about what was seen. However, when the same stimulus was presented only to the left visual field, and hence transmitted to the right side of the brain, the non-verbal right side of the brain was unable to speak about what was seen. Sperry then observed that even though the patient was not able to speak about what had been seen in the left visual field, she was able to identify the picture by pointing with the left hand, thus using the non-verbal ability of the right half of the brain. In other words, even though the information had reached the right side of the brain, the right brain could only respond by pointing, not by talking.

In another test situation, Dr. Sperry shielded the patient's view and asked the patient to touch several plastic house numbers with the left hand. When asked to signal the correct number, the patient correctly held up the number of fingers represented by the house number. When asked to say the number, however, the patient was unable to respond correctly. The task was then reversed, by having the patient use the right hand to feel the numerals. Now the patient could both say and signal the numeral, as both verbal and mathematical abilities were involved.

Dr. Sperry then provided the patient with objects to feel with one hand and asked the patient to retrieve the same object by feeling for it in an array of similar objects behing a shield. He found that the same hand used in initial feeling and later searching could readily retrieve the item, while opposite hands could not.

From these and other observations with split brain patients since the early sixties, has come the realization that the functions of the two hemispheres of the brain tend to be qualitatively different. The left hemisphere, for most people, appears to be more dominant than the right hemisphere, and is more strongly verbal, mathematical, logical, analytical, sequential, time-oriented and abstract. The left hemisphere is considered to be the major controller of speech, reading, and writing; and is generally recognized as the hemisphere toward which education has traditionally been directed.

By contrast, the right hemisphere has relatively limited verbal and mathematical skills, but excels in non-verbal skills. For example, the visual imagery ability that enables us to conjure up images of what we are reading is regarded as a function that is localized in the right brain. In addition, the right hemisphere gives us a sense of spatial orientation and helps us recognize faces and places. It is the hemisphere which appears responsible for providing the intuitive, imaginative, musical, simultaneous, creative side of our being. It is the side of human consciousness that many educators and psychologists are claiming has been neglected in our schools. (1, 3, 6, 8, 11)

The duality represented by these medical and psychological findings has been discussed by philosophers since earliest times. (11) Educators too have frequently described what in essence is two ways of knowing. To now have a physiological basis supporting the notion that our students

do indeed learn in different ways, at different times, and with different tasks will hopefully cause us as educators to more enthusiastically and conscientiously re-examine our beliefs about human learning.

TEACHING IMPLICATIONS

This section may begin to sound like a chapter from a college text book on "good teaching practices," or a teacher's testimonial on what has worked well in the classroom, and so it should; for the findings of split brain research have an almost uncanny way of reinforcing those beliefs and practices that have over the years been found to enhance learning.

To begin with, consider these three general implications. First, instruction in reading comprehension must seek to draw on the functioning of both hemispheres of the brain. INTEGRATION of the two hemispheres of the brain is essential to the functioning of both hemispheres. There is a natural tendency of the hemispheres to assist each other in problem solving, and teachers need to learn how to encourage expression of the non-dominant and creative right hemisphere to facilitate the active, analytical, verbal, problem-solving left hemisphere. A statement by Einstein (2:91) clearly describes the interrelationship of the hemispheres: "The really valuable thing is intuition. A thought comes and I may try to express it in words afterward."

Second, instruction in reading comprehension must be viewed as instruction in thinking. The fact that reading comprehension involves a complex interrelationship of thought processes to gain various levels of meaning, is an old idea that gains new meaning when the findings of split brain research are considered. Ulrich Neisser (7:136), cognitive psychologist, defines reading as "externally guided thinking" and

suggests that, "Perhaps we should not be so surprised that it is so poorly understood; we may not understand it until we understand thought itself." As recent brain research increases our understanding of human thought processes, our understanding of reading comprehension will also grow. The implication for the teacher of reading to draw upon both modes of knowing to enhance comprehension becomes no small challenge.

Third, by ignoring the legitimate function of the right hemisphere only half of the child is being taught. By ignoring the creative, intuitive, visual-spatial aspects of the brain, those valuable thought processes may stagnate. Effective teaching of the reading-thinking process must consciously and purposefully draw upon both sides of the brain.

Although numerous specific teaching-learning activities are suggested by these three general implications, this discussion is limited to 1) the art of questioning, 2) the importance of a literature and writing program, 3) analysis of learning tasks, and 4) individual conferences.

First, consider how crucial the art of questioning is to the development of reading comprehension. It is the active art of questioning by both the student and the teacher that must be stressed. According to Wittrock (11) the teacher must stimulate students to actively construct meaning from their own experiences. McKim (6) suggests a right brain activity called the "mind's eye, ear, nose, etc. technique" to elicit a student's visual image of what is being read. Stauffer (10) recommends student-set purposes or questions for reading. Such active participation by the learner not only increases attention, but if based on predictions made by the student, it also is an opportunity for the teacher to encourage

convergent and divergent, as well as inductive and deductive thinking.

Second, daily exposure to literature and writing as an avenue to reading comprehension cannot be over-emphasized. According to Northrop Frye, (3:xiii) literary critic the place of literature in an elementary school program is "to provide the verbal element in the training of the imagination. The imagination is not a self-indulgent, ornamental, or escapist faculty: it is the constructive power of the mind." While carefully planned daily experiences with various forms of literature develop imaginative powers, daily writing opportunities can serve to organize and refine student thinking. Responses to literature that include drama, art, and music are truly valid, and thus draw upon both modes of knowing.

Third, the analysis of learning tasks (diagnostic teaching) seems all the more valid in light of the findings of split brain research which indicate that observation of student visual imagery ability, for example, may be as important as observation of performance in the traditional academic skills.

Finally, individual conferences (teacher-pupil, pupil-pupil, parent-teacher) can provide invaluable insight into individual children's learning styles. Children themselves can become researchers, along with the teacher, and develop awareness of how they themselves learn.

Awareness, acceptance, and appreciation of different ways of comprehending the world and the written word are strongly needed to apply split brain research to the classroom. In summary, our knowledge of the two hemispheres can help us see the complexities of learning a little more clearly and impress upon us the need for increased diversity in curricula and methods. Knowledge of the functioning of the hemispheres can also heighten our aware ness of the legitimacy of using and encouraging

the development of the right hemisphere along with the left. Edmund Burke Huey (5:6) expressed similar thoughts at the turn of this century, and may well have been an avid researcher in the area of split-brains were he here today; for in his opinion,

> to completely analyze what we do when we read would almost be the acme of a psychologist's achievements, for it would be to describe many of the most intricate workings of the human mind, as well as to unravel the tangled story of the most remarkable specific performance that civilization has learned in all its history.

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